
Ferroelectricity Newsletter

A quarterly update on what's happening in the field of ferroelectricity

Volume 11, Number 3

Summer 2003

LISTS OF ISIF 2003 PAPERS SHARE THIS ISSUE WITH UPCOMING MEETINGS ON POLYMERS

A large portion of this issue is taken up by listing about two thirds of the presentations given at the 15th International Symposium on Integrated Ferroelectrics held on 9-12 March 2003 in Colorado Springs. In addition to the papers of the plenary sessions, the list covers both oral and poster contributions in the fields of FeRAM process integration; MEMS, pyroelectrics and optoelectrics; high-K dielectrics; circuit design and architecture; crystal-line oxides; multi-ferroics and graded ferroelectrics; modelling and theory; and the oral presentations of CVD processing.

The rest of the ISIF 2003 papers — the poster session of CVD processing; domains and nanostructures; FeRAM materials; as well as testing and characterization — will be listed by author and title in the fall issue of the *Ferroelectricity Newsletter*. There we also hope to bring you a report on ISIF 2003 by one of our senior contributors.

Before drawing your attention to several short courses in polymers, we want to highlight the up-coming meeting on **Processing of Electroceramics** at the beginning of September in the beautiful Slovenian town of Bled. (See page 12)

Next in line is the **8th Wide-Bandgap III Nitride Workshop** presented by the Materials Research Society in Richmond, Virginia. You'll find this information on page 13.

The American Chemical Society presents several short courses on polymers in cooperation with Virginia Tech in Blacksburg: **Polymer Chemistry: Principles and Practice** in August and December and **Introduction to Polymeric Adhesives and Composites** in October. The course **Frontiers in Inorganic Polymers** will be held this October in Philadelphia. Please go to pages 13-15 for details on these upcoming events.

If you are looking for more information on the registration of the **Eric Cross symposium** this September in Leeds, visit the website given in the box on page 12.

We hope that your work this summer will be interspersed with periods of revitalizing rest and relaxation.

Rudolf Panholzer
Editor-in-Chief

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ISIF 2003 PAPERS

15TH INTERNATIONAL SYMPOSIUM ON INTEGRATED FERROELECTRICS (ISIF 2003)

The 15th International Symposium on Integrated Ferroelectrics took place on 9-12 March 2003 in Colorado Springs, Colorado, USA.

The science of ferroelectric thin films and their technological applications have experienced rapid and substantial progress. The worldwide increase in practical commercial applications is a sign of both the maturity of the field and the acceptance the technology has achieved. The field of ferroelectric/piezoelectric materials is still growing rapidly due to the potential applications in MEMS technologies and the development of new generations of DRAMs.

In this issue we list the contributions in the following fields: Plenary sessions, FeRAM process integration; MEMS, pyroelectrics and optoelectronics; high-K dielectrics; circuit design and architecture; crystalline oxides; multi-ferroics and graded ferroelectrics; modelling and theory; and the oral presentations of CVD processing. The rest will follow in the next issue.

PLENARY SESSIONS

Enabling the Mobile Internet:
System-on-chip with ferroelectric
memory

Hans Stork

The vision and future direction of
FeRAM

Young-Jin Park

Scaling properties of ferroelectrics
based RAM concepts compared to
other non-volatile memories

Rainer Waser

FeRAM PROCESS INTEGRATION

Challenges for integration of
embedded FeRAMs in the sub-180
nm regime

R. Zambrano

Spacers alternatives for integration
of (3-D) stacked SBT FECAPs

J.G. Lisoni, J. Johnson, J.L. Everaert, V. Paraschiv, D. Maes, L. Haspeslagh, D. Wouters, C. Caputa, P. Casella, C. Artoni, R. Zambrano, G. Vecchio, H. Monchoix, and L. van Autryve

Plasma etch processes for embedded
FeRAM integration

F.G. Celii, M. Thakre, M. Gay, S. Summerfelt, S. Aggarwal, J.S. Martin, K.R. Udayakumar, and T.S. Moise

Characteristics of an oxygen barrier
based on bi-layered Ir

B.K. Moon, K. Tsutsumi, O. Arisumi, R. Bruchhaus, H. Itokawa, K. Hornik, C.U. Pinnow, I. Kunishima, N. Nagel, K. Yamakawa, and G. Beitel

Embedded ferroelectric memory
with 0.58 μm^2 cell size using 130nm,
5 LM Cu/FSG logic process

S.R. Summerfelt, T.S. Moise, H. McAdams, S. Aggarwal, K.R. Udayakumar, F.G. Celii, J.S. Martin, G. Xing, L. Hall, K.J. Taylor, J. Rodriguez, K. Remack, M.D. Khan, K. Boku, G. Albrecht, and B. McKee

Highly reliable 0.35 μm FRAM
using MOCVD-PZT thin film
capacitors

K. Matsuura, K. Takai, O. Matsuura, Y. Ozaki, Y. Horii, Y. Hikosaka, K. Maruyama, and T. Eshita

Fabrication of Pb(Zr, Ti)O₃ thin
films by liquid source misted
chemical deposition method
equipped with mist droplet-size
controller

Susamu Kawasaki, Shin-Ichi Motoyama, Toshiaki Tatsuta, Osamu Tsun, and Tadashi Shiosaki

Interface evolution of Pb(Zr_xTi_{1-x})
O₃/Ir films during the film growth
by metalorganic chemical vapor
deposition

Moon-Sook Lee, Kun-Sang Park, Sang-Don Nam, Kyu-Mann Lee, Suk-Ho Joo, Sang-Woo Lee, Hyeong-Geun An, Hyoung-Joon Kim, Sung-Lae Cho, Yoon-Ho Son, Yong-Yoo Jung, Jang-Eun Heo, Soon-Oh Park, U-In chung, and Joo-Tae Moon

Novel common cell via and etch
stopper technology for 0.25 μm 32
Mb FRAM devices

N.W. Jang, Y.J. Song, H.H. Kim, H.J. Joo, J.H. Park, H.J. Kang, S.Y. Lee, and Kinam Kim

Development of a new hydrogen
barrier encapsulation layer

V. Joshi, S. Narayan, J. Celinska, and C.A. Araujo

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Novel damage curing technology on one-mask etched ferroelectric capacitor for beyond 0.25 μm FRAM

J.H. Park, H.H. Kim, N.W. Jang, Y.J. Song, H.J. Joo, H.Y. Kang, S.Y. Lee, and Kinam Kin

Improvement in ferroelectric properties of Pt/SrBi₂Ta₂O₉/Pt capacitor by blocking impurity indiffusion from interlevel dielectric layer

Sang Hyun Oh, Suk-Kyoung Hong, Jin Gu Kim, Jin Yong Seong, Young Ho Yang, and Young Gin Park

First 0.18 μm SBT-based embedded FERAM technology with hydrogen damage-free stacked cell structure

Eiji Fujii

Anisotropic etching of iridium electrodes for high-density FRAM capacitors

Chris Ying, Reggie Mananquil, Amitabh Sabharwal, Ajay Kumar, Francis Celii, Mahesh Thakre, Robert Kraft, Scott Summerfelt, and Ted Moise

Profile and device characterization of Ir/PZT/Ir stacks etched at high wafer temperature

Steven Marks, John Almerico, and Les Jerde

Surface analysis and structural properties of ferroelectric Bi modified YMnO₃ films

Taekjib Choi, Si Won Kim, Kyun Sun Youn, Young Sung Kim, and Jaichan Lee

RIE and IBE etching for ferroelectric memories

Tan-Qi Shao, Tian-Ling Ren, Chao-Gang Wei, Xiao-Ning

Wang, Chun-Xiao Li, Jian-She Liu, Li-Tian Liu, Jun Zhu, and Zhi-Jian Li

MEMS, PYROELECTRICS AND OPTOELECTRICS

Piezoelectric devices based on ferroelectric thin films

S. Trolrier-McKinstry, S. Gross, E. Hong, J. Nino, T. Yoshimura, Q. Zhou, Q. Zhang, T. Jackson, S. Tadigadapa, S. Krishnaswamy, C. Freidhoff, and F. Djuth

Nanoscale properties and local electromechanical response of ferroelectric films for MEMS

A.L. Kholkin, V.V. Shvartsman, A.Yu. Emelyanov, and A. Safari

Piezoelectric properties of Pb(Zr,Ti)O₃ films for microsensors and actuators

Seung-Hyun Kim, Jeong-Suong Yang, Chang Young Koo, Jung-Hoon Yeom, and Jowoong Ha

Thickness dependence of piezoelectric properties for PZT thin films with regard to MEMS applications

C. K  geler, P. Gerber, U. B  ttger, and R. Waser

Giant piezoelectric response in epitaxial 67PbMg_{1/2}Nb_{2/3}O₃-33PbTiO₃ heterostructure on silicon for high performance electromechanical systems

C.B. Eom, S. Trolrier-McKinstry, D.G. Schlom, R. Ramesh, X.Q. Pan, and S.K. Streiffer

Ferroelectric and pyroelectric properties of sol-gel derived PbCaTiO₃ thin films using low-

temperature annealing process
Jing-Tang Yang, Han-Chang Pan, Hsien-Lung Tsai, and Chen-Chia Chou

Determination of mechanical properties of sol-gel PZT by thin film tensile specimen measurements

J.S. Pulskamp, A.E. Wickenden, R. Polcawich, M. Ervin, and M. Dubey

Local growth of sol-gel films by means of micro hot-plates

F. Calame, J. Baborowski, S. Gentil, N. Ledermann, and P. Muralt

Recent advances in piezoelectric micromachined ultrasonic transducers based on PZT films

Paul Muralt

Fabrication and characterization of PZT coated silicon membranes for ultrasonic micromachined transducers (PMUTs)

Jacek Baborowski, Nicolas Ledermann, and Paul Muralt

The effect of AlN microstructure on the processing and performance of MEMS and NEMS resonant devices

A.E. Wickenden, L.J. Currano, T.P. Takacs, M. Dubey, S. Hullavarad, and R.D. Vispute

Morphology of PZT-PMN films grown from airflow

Vyacheslav Popov, Birger Emmoth, Alex M. Grishin, Eugene Stytsenko, Martin J. Ryan, and Marc Daglish

Thick PZT micro-features obtained

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by direct patterning of photosensitive precursor solutions

S. Marson, R.A. Dorey, Q. Zhang, and R.W. Whatmore

Design and fabrication of lead zirconate titanate (PZT) acoustic sensor

R.G. Polcawich, J. Pulskamp, J. Clarkson, and Madan Dubey

Electro-optic Pb(Zr,Ti)O₃ film Pockels cell

Maria Ofelia Vietez, S.I. Khartsev, and A.M. Grishin

Snapshot image sensors based on charge storage at semiconductor-ferroelectric interfaces

G. Suchaneck and G. Gerlach

Electromechanical properties of Nd-doped Bi₄Ti₃O₁₂ film: A candidate for lead-free thin film piezoelectrics

Hiroshi Maiwa, N. Iizawa, D. Togawa, M. Yamada, W. Sakamoto, Takashi Hayashi, and Shin-Ichi Hirano

RF sputtered Na_{0.5}K_{0.5}NbO₃ films on oxide substrates as optical waveguiding material

Mats Blomqvist, Sergey Khartsev, Alex Grishin, and Adrian Peiraru

POSTERS

Computation of frequency response integrated pyroelectric infrared detectors

A.K. Batra, J.R. Currie, S.K. Aggarwal, M.D. Aggarwal, and R.B. Lal

Piezoelectric properties of metalorganic chemical vapor

deposited Pb(Zr, Ti)O₃ thin films on Ir protected Si substrates

Choong-Rae Cho, Sangmin Shin, June-Mo Koo, June Key Lee, and Youngsoo Park

Fabrication of PZT-based thin film bulk acoustic wave resonators using multilayer reflector

Cheng Hsien Chou, Shih-Yen Liu, Jin-Hua Huang, and I-Nan Lin

Screen printed PZT thick films using composite film technology

R.A. Dorey, R.W. Whatmore, S.P. Beeby, R.N. Torah, and N.M. White

Investigations of the pyrochlore/perovskite phase formation in lead magnesium niobate relaxor materials

A.A. Savvinov, S. Bhaskar, and R.S. Katiyar

Electromechanical characteristics of micromachined PZT cantilever integrated with piezoresistive sensor for bio sensor applications

Ghi Yuun Kang, Hyung Ho Park, and Tae Song Kim

Fabrication of ZnO based film bulk acoustic resonator for GHz frequencies

Sun Wook Kim, Seung Man Lim, Su Bong Jung, Sun Yung Kim, Soo Gil Kim, Neung Heon Lee, and Young Hwa Shin

Growth and SAW velocity measurements of textured Pb(Zr_{0.53}Ti_{0.47})O₃ films on sapphire substrate

Srinivas Kuchipudi, I-Nam Lin, Ying Hao Zhu, and Su-Jien Lin

Microwave dielectric properties of ferroelectric Pb(Zr_{1-x}Ti_x)O₃ thin films using interdigital capacitors

Min Hwan Kwak, Seung Eon Moon, Su-Jae Li, Young Tae Kim, and Han-Cheol Ryu

Large frequency dispersion in dielectric properties of 0.7Pb(Mg_{1/3}Nb_{2/3})O₃-0.3PbTiO₃ thin films

Apurba Laha, S. Saha, and S.B. Krupanidhi

Fabrication and electro-mechanical properties of piezoelectric micro-cantilever for micro-balance

Sanghun Shin, Sangguen Song, Young Sung Kim, and Jaichan Lee

Prepare PNN-PZT thick film on Pt/Ti/SiO₂/Si substrate by laser lift-off process

Kun-Yu Li, Nyan-Hwa Tai, and I-Nan Lin

Ferroelectric and piezoelectric properties of (111)- and (117)-oriented praseodymium-substituted bismuth titanate polycrystalline thin films

Hiroyumi Matsuda, Sachiko Ito, and Takashi Iijima

Fabrication of ultra thin IrO₂-top-electrode for improving emission current density in MIM cathodes

Tae Joo Park, Doo Seok Jung, Cheol Seon Hwang, Min Soo Park, and Nam-Seok Kang

Microwave performance of distributed analog phase shifter using ferroelectric (Ba, Sr)TiO₃ thin films

Han-Cheol Ryu, Young-Tae Kim, Seung-Eon Moon, Min-Hwan Kwak, and Su-Jae Li

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PZT MEMS for extremely sensitive magnetometer

Eugene Zakar, Ronald Polcawich, Madan Dubey, Jeff Pulskamp, Alma Wickenden, John Conrad, Richard Piekarz, Dennis Wickenden, and John Champion

BAW resonators and filters using surface micromachining

Hong-Jin Zhao, Tian-Ling Ren, Peng Cong, Jian-She Liu, Li-Tian Liu, and Zhi-Jian Li

Design of a novel piezoelectric pressure sensor using surface micromachining

Hong-Jin Zhao, Peng-Sheng Huang, Tian-Ling Ren, Li-Tian Liu, and Zhi-Jian Li

Fabrication of high quality PZT thick film using silicon mold technique

Hong-Jin Zhao, Tian-Ling Ren, Jian-She Liu, Li-Tian Liu, and Zhi-Jian Li

Si substrate and heat treatment condition for the PZT-PCW thick film fabrication using screen printing method

Yong-Bum Kim, Jin-Ho Son, Hyung-Joon Kim, Che-Il Chun, Kwang-Soo Yoo, Doo-Jin Choi, and Tae-Song Kim

Preparation of $\text{Pb}(\text{Zr},\text{Ti})\text{O}_3$ thin films on silica substrate by metallo-organic decomposition

Chien-Kang Kao, Chuen-Hong Tsai, and I-Nan Lin

Dielectric and pyroelectric properties of lead zirconate titanate composite films

M.K. Cheung, K.W. Kwok,

H.L.W. Chan, and C.L. Choy

Theoretical study on the tip-deflection of multilayer piezoelectric cantilever structures

C. Huang, Y.Y. Lin, and T.A. Tang

Thin-film bulk acoustic resonators and filters using PZT/PT based structures

Hong-Jin Zhao, Tian-Ling Ren, Jian-She Liu, Li-Tian Liu, and Zhi-Jian Li

Dielectric characteristics of in-plane polarized lead zirconate titanate thin films on oxide layers

K.P. Kwok, K.W. Kwok, H.L.W. Chan, and C.L. Choy

Effect of Zr doping in barium titanate thin films

A. Dixit, S.B. Majumder, P.S. Dopal, and R.S. Katiyar

Characteristics of NiCr thin films as absorber layer for pyroelectric infrared sensors

Nak-Jin Seong, Sheng-Sheng Zhao, Kyu-Yeong Choi, and Soon-Gil Yoon

Growth and studies of calcium doped laser ablated barium titanate thin films

P. Victor, R. Ranjith, A.K. Tyagi, R. Rajogopalan, and S.B. Krupanidhi

HIGH K DIELECTRICS

$(\text{Ba}_x\text{Sr}_{1-x})\text{TiO}_3$ thin film devices using heterostructured Cu-based electrodes

W. Fan, S. Saha, J.A. Carlisle, O. Auciello, R.P.H. Chang, and R.

Ramesh

High dielectric permittivity in $\text{AFe}_{1/2}\text{B}_{1/2}\text{O}_3$ nonferroelectric perovskites (A - Ba, Sr, Ca; B - Nb, Ta, Sb)

I.P. Raevski, S.A. Prosandeev, A.S. Bogatin, M.A. Malitskaya, and L. Jastrabik

Nickel integration and enhanced dielectric properties of $\langle 100 \rangle$ oriented SrTiO_3 and $(\text{Ba},\text{Sr})\text{TiO}_3$ thin films

J.T. Dawley, R.J. Ong, and P.G. Clem

$\text{Na}_{0.5}\text{K}_{0.5}\text{NbO}_3$ films on Pt by pulsed laser deposition and magnetron sputtering

S.J. Khartsev, J.-H. Koh, and A.M. Grishin

Review on the recent progresses in the DRAM capacitor technologies

Cheol Seong Hwang, Hongbae Park, Ohseong Kwon, Jaehoo Park, and Wandon Kim

Properties of ultrathin epitaxial BaTiO_3 films grown by MBE

J. Rodriguez Contreras, J. Schubert, K. Szot, C.L. Jia, H. Kohlstedt, R. Waser, J. Haeni, M. Biegalski, and D.G. Schlom

Dielectric properties of single crystal PMNT thin films

K. Wasa, I. Kanno, H. Seon, D.Y. Noh, H. Okino, and T. Yamamoto

Structural and dielectric properties of heterostructured

$\text{Ba}_{0.5}\text{Sr}_{0.5}\text{TiO}_3\text{:MgO}$ thin films by sol-gel technique

M. Jain, S.B. Majumder, R.S. Katiyar, and A.S. Bhalla

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Understanding thick dielectric films: MOCVD ($\text{Ba}_{0.7}\text{Sr}_{0.3}\text{Ti}_{1+y}\text{O}_{3+z}$) films

S. Saha, D.Y. Kaufman, S.K. Streiffer, and O. Auciello

Point defect distributions and their electrical effect on BST thin films

Ruey-Ven Wang and Paul C. McIntyre

Widening of operational temperature range of microwave ferroelectric tunable devices

O.G. Vendik, M.A. Nikol'ski, and S.P. Zubko

Investigation of BSTO film based transmission line for direct phase modulation of microwave carrier

T. Samoilova, E. Shafranov, A.B. Kozyrev, T. Kaydanova, D.S. Ginley, J.D. Perkins, J. Alleman, L. Sengupta, L. Chiu, and X. Zhang

Synthesis and characterization of nanostructures BSTO thin films for microwave application

Bonnie Riehl, Guru Subramanyam, Rand Biggers, Angela Campbell, Fred Van Keuls, and Felix Miranda

Multilayer BST capacitors fabricated on glazed alumina substrates

I. Koutsaroff, M. Zelnier, A. Kassam, L. McNeil, P. Woo, T. Bernacki, A. Cerwin-Lawry, and A. Patel

PZT-based films synthesized on metal foils by chemical solution deposition for advanced electronic systems

Dong-Joo Kim, D.Y. Kaufman, S.K. Streiffer, and O. Auciello

Electrical properties of high zirconia content PLZT thin films

D.P. Williams, B.A. Tuttle, J.S. Wheeler, M.A. Rodriguez, and W.R. Olson

S-band microwave phase shifters based on ferroelectric varactors

A. Kozyrev, V. Osadchy, A. Pavlov, D. Kosmin, L. Sengupta, X. Zhang, and L. Chiu

Millimeter-wave loaded line ferroelectric phase shifters

A. Kozyrev, A. Ivanov, O. Soldatenkov, A. Tumarkin, S. Ivanova, T. Kaydanova, J.D. Perkins, J. Alleman, D.S. Ginley, L. Sengupta, L. Chiu, and X. Zhang

Electrical characterization of PMNT thin films

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Microwave dielectric properties of (111) oriented ferroelectric ($\text{Ba}_{1-x}\text{Sr}_x$) TiO_3 thin films

Seung Eon Moon, Eun-Kyong Kim, Su-Jae Lee, Min Hwan Kwak, Young Tae Kim, Han-Cheol Ryu, and Won-Jeong Kim

Electrode effects of the sol-gel derived lead magnesium niobate-lead titanate thin films

Jin Ho Oh, Jae Hwan Eun, Kook Hyun Choi, Hyeong Joon Kim

Electrical properties of (Ba,Sr) TiO_3 thin film capacitors prepared by on- and off-axis RF magnetron sputtering

Wooyoung Park, Kun Ho Ahn, and Cheol Seong Hwang

Microwave properties of thin BSTO films for high frequency applications

S.V. Razumov, A.V. Tumarkin, M.M. Gaidukov, A.G. Gagarin, O.U. Buslov, and A.M. Prudan

Microwave tunable properties of Ni-doped (Ba,Sr) TiO_3 thin films grown by pulsed laser deposition

Tae-Suck Seo, Ill-Doo Kim, Young-Nam Oh, and Soon-Gil Yoon

Investigation of Ru thin films prepared by chemical vapor deposition as bottom electrodes for memory applications

Sang Yeol Kang, Ha Jin Lim, Cheol Seong Hwang, and Hyeong Joon Kim

Pulsed laser deposited $\text{Ba}(\text{Mg}_{1/3}\text{Ta}_{2/3})\text{O}_3$ microwave dielectric thin film

Ying-Hao Zhu, Su-Jien Lin, Kuo-Shung Liu, and I-Nan Lin

Temperature and thickness dependencies of dielectric constant of (Ba,Sr) TiO_3 thin film capacitors having Pt and oxide electrodes

Kun Ho Ahn, Wooyoung Park, and Cheol Seong Hwang

Measurements of ferroelectric film parameters in frequency range (20-60) GHz

A. Kozyrev, O. Buslov, V. Keis, D. Dovgan, I. Kotelnikov, P. Kulik, L. Sengupta, L. Chiu, B. Treadway, T. Kaydanova, J.D. Perkins, J. Alleman, and D.S. Ginley

14 GHz tunable filter on base of finline resonators

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D. Dovgan, I. Kotelnikov, P. Kulik, L. Sengupta, L. Chiu, X. Zhang, and K. Shamsaifar

Parascan™ thick films for high frequency tunable devices
Marion E. Ellis, Fredrick Duvall, Barry Treadway, Shawn Tang, and Elijah Underhill

Characterization of Ni-doped BST thin films on LSCO buffer layer prepared by pulsed laser deposition
Hyun-Suk Kim, Il-Doo Kim, Jeong-Ho Park, Mi-Hwha Lim, Myung-Sun Kim, and Ho-Gi Kim

Lateral epitaxial growth of (Ba,Sr)TiO₃ thin films
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Microwave characterization of BST thin films on LAO interdigital capacitor
Y.L. Cheng, N. Chong, J.Z. Liu, Y. Wang, H.L.W. Chan, and C.L. Choy

Heteroepitaxial growth of high K dielectric thin films by pulsed laser deposition
W.M. Yu and K.H. Wong

The influence of thermal strain and thickness on sputtered (100) SrTiO₃ films deposited on Pt/SrTiO₃ and Pt/MgO heterostructures
T.R. Taylor, P.J. Hansen, R.A. York, and J.S. Speck

Preparation of PZN-based ceramics using sequential mixing columbite method
Chen-Liang Li and Chen-Chia Chou

Microstructural properties of Ba_{0.6}Sr_{0.4}TiO₃/RuO₂ multi-layers

grown on MgO and YSZ by pulsed-laser deposition
P. Lu and Q.X. Jia

Figure of merit of tunable ferroelectric planar filters
Vladimir Pleskachev and Irina Vendik

True single-crystalline ferroelectric thin films by ion implantation and direct wafer bonding
I. Szafraniak, I. Radu, R. Scholz, M. Alexe, and U. Gösele

Thickness dependent permittivity of (Ba_{0.5}Sr_{0.5})TiO₃ thin films grown by pulsed laser deposition
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Theoretical estimation of achievable figure of merit of microwave ferroelectric phase shifters
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Characterization of BaTiO₃-BaZrO₃ solid solution thin films prepared by MOCVD
R. Ganster, S. Hoffmann-Eifert, and R. Waser

CIRCUIT DESIGN AND ARCHITECTURE

A critical review and future prospects of non-destructive readout ferroelectric gate FET memories
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Ferroelectric nonvolatile logic devices
Y. Fujimori, T. Nakamura, H. Takasu, H. Kimura, T. Hanyu,

and M. Kameyama

Design of a ferroelectric programmable logic gate array
Todd C. MacLeod and Fat D. Ho

A fundamental study on nonvolatile ferroelectric FPGA
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A current-gain scheme 16Mb FeRAM
Hee-Bok Kang, Dong-Yun Jeong, Jae-Hyoung Lim, Seaung-Suk Lee, Seung-Jin Yeom, Suk-Kyoung Hong, Sung-Sik Kim, Kyoung-Rok Cho, Jin-Yong Chung, and Young-Jin Park

4Mb ferroelectric test chip designed for process integration and discrete capacitor characterization
H.P. McAdams, J. Fong, T.S. Moise, S.R. Summerfelt, J.T. Rickes, J. Grace, and R. Lanham

Operation simulation of an 8F²1T2C-type ferroelectric memory array with a revised data writing method
Hyun-Soo Kim, Shuu'ichirou Yamamoto, and Hiroshi Ishiware

Fabrication and characterization of gate-connected 1T2C-type ferroelectric memory with paired Bi_{4-x}La_xTi₃O₁₂ (BLT) capacitors
Bon Jae Koo and Hiroshi Ishiware

Circuits for data sensing in ferroelectric memories
Ali Sheikholeslami

The ferroelectric slab waveguide: A novel approach to incorporating

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ferroelectric materials into microwave systems

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Improved performance in BST-based tunable circuits employing low-loss normal dielectric

T. Kaydanova, J.D. Perkins, J. Alleman, A.M. Prudan, M.M. Gaidukov, and D.S. Ginley

Improved performance compact phase shifters using BST

Justin Serraiocco, Pete Hansen, Troy Taylor, Jim Speck, and Robert York

Design of tunable balanced amplifier using ferroelectric materials

José Colom-Ustariz, Rafael Medina, and Rafael Rodríguez-Solis

Fabrication of 1T2C-type ferroelectric memory cell array

T. Ishikawa, S. Yamamoto, T. Fuchikami, T. Furukawa, K. Aizawa, B.-E. Park, S. Kikuchi, H. Ohki, H. Hoko, and H. Ishiware

Optimum reflection-type phase shifter using (Br,Sr)TiO₃ thin film

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Design of a triaxial piezoelectric accelerometer

Peng-Sheng Huang, Tian-Ling Ren, Qi-Wei Lou, Jian-She Liu, Li-Tian Liu, and Zhi-Jian Li

Tunable voltage controlled oscillator (VCO) with high

dielectric constant BCTZ capacitors

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An embedded 8K FeRAM for a contactless smart card

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**To be continued
in the next issue, Vol. XI, No. 4**

UPCOMING MEETINGS**Processing of Electroceramics Symposium 2003
31 August - 3 September 2003
Bled, Slovenia**

You are cordially invited to participate at the Processing of Electroceramics Symposium 2003, which will be held from 31 August to 3 September 2003 in Bled, Slovenia. The symposium is organized with the sponsorship of the EU's POLICER Thematic Network.

As well as being a skill, processing is also an art, and it is our aim to unite as far as possible these two aspects. We would like to bring together people from research, development, and manufacturing, from universities and industries, people from all over the world to teach, to learn, to present and to discuss results that reflect our current understanding of the processing of electroceramics, from classical to novel routes, from nano- to macro-dimensions, from chemistry and physics to processing and engineering, from polycrystals and oriented structures to monocrystals, from bulk to thick and thin films, from monolayers to 3D structures, from processing via microstructure to functional properties.

Early September in Bled is still a time of bright sunny days and pleasant temperatures. With the high season behind us, we're left with the relaxed atmosphere of this beautiful town with its unique lake surrounded by mountains. It is just the right place for peaceful work and to get together with old and new friends.

We look forward to seeing you in Bled.

Prof. Dr. Marija Kosec
Chair

Publications

The proceedings of the meeting will consist of the collected manuscripts provided by the invited speakers. The abstract book will consist of the abstracts of all posters and the invited-speaker contributions.

The abstracts of the invited-speaker contributions and a list of the contributed papers is available on the web:

<http://dolomit.ijs.si/procbled/>

Contact

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55 years of ferroelectrics

The registration details of the Eric Cross symposium this September in Leeds are now available at

www.ferroelectrics.org
under the **Events** link.

UPCOMING MEETINGS

**8th Wide-Bandgap III Nitride Workshop
29 September - 1 October 2003
Omni Richmond Hotel, Richmond, Virginia, USA**

The Nitride Workshop, chaired by Dr. Cole W. Litton (Air Force Research Laboratory), is the 8th in a series that began in St. Louis in 1992. Participation of the entire GaN materials and device community is encouraged.

Topics

- GaN substrate development
- III-nitride epitaxial growth
- Properties and applications of narrow-gap III nitrides
- Structural characterization of III nitrides
- Optical and electrical characterization of III nitrides
- Defects, doping and compensation of III nitrides
- Polarity and polarization field in Wurtzitic GaN and related III nitrides
- Compositional stability of III-nitride alloys and heterostructures
- III-nitride nanostructures
- Advances in dry and wet-etch processing of III nitrides
- UV optical sources and detectors
- III-nitride optoelectronic devices
- III-nitride electronic devices

The program will include short (15-minute) oral presentations; poster sessions are also expected. Generous time for questions will be scheduled and no parallel sessions are planned.

Contact

For the most up-to-date information on this workshop, as well as other meetings and event from the **Materials Research Society**, visit

www.mrs.org/meetings/

**Polymer Chemistry: Principles and Practice
17-22 August 2003
7-12 December 2003**

Donaldson Brown Hotel and Conference Center, Virginia Tech, Blacksburg, Virginia, USA

Any research chemist, engineer, physicist, or technician who works or is beginning to work with polymers and their applications should attend this in-depth lecture-laboratory course. Managers in the polymer industry will also greatly benefit from it.

The course is structured for all educational levels, from bachelor degree through PhD. No prior knowledge of polymer science is assumed.

Note: Because of the amount of lab space, enrollment is strictly limited to 30. Each participant should bring a hand calculator and comfortable clothing, arriving early enough on Sunday to be well rested for the first evening session that will extend to approximately 10:00 pm.

UPCOMING MEETINGS

Topics

- Polymer synthesis, molecular weight determination, and the characterization of rheological and viscoelastic behavior
- Polymer structure and morphology
- Mechanical testing of elastomers, plastics, fibers, films, and glasses
- Structure/property examples from the fields of adhesion and composites
- Measurement of various properties of polymers, which are then discussed as functions of chemical composition, molecular weight, topology, morphology, etc.

Registration

<http://chemistry.org/shortcourses>

Contact

American Chemical Society Short Courses
phone: 800-227-5558 or +202-872-4508; email: shortcourses@acs.org

Introduction to Polymeric Adhesives and Composites 12 - 17 October 2003

Donaldson Brown Hotel and Conference Center, Virginia Tech, Blacksburg, Virginia, USA

This lecture-laboratory course is designed for BA/BS through PhD level industrial chemists, materials scientists, plastics engineers, and chemical engineers who are involved in the development and manufacturing of high performance composites and/or adhesives. Although advanced prior knowledge of the subject area is *not* assumed, participants should have a broad scientific base in materials, industrial experience, or some training in adhesives, composites and polymers.

How you'll benefit from this course

- Consult with seasoned experts about your adhesives and composites problems
- Bring yourself up to speed on "cutting edge" technology
- Learn about micromechanics and how it can change your problem-solving approach
- Discover improved ways to measure stress and strain in advanced materials
- Evaluate new polymeric materials for complex structural applications
- Learn how to apply composite design
- Know when to worry about fiber surface treatment and how to test for it
- Integrate new matrix materials performance with composite behavior
- Use tested methods for interfacial characterization and surface modification for improved adhesion in the lab
- Learn the advantages of a comprehensive, integrated approach to performance and durability
- Know how to evaluate the durability of advanced structures
- Find out how to determine when crystallization of matrices is improved and the benefits to be gained
- Learn how to cope with environmental effects on your advanced materials
- Know how to choose mechanical test equipment and fiber/matrix test equipment
- Recognize the essential ingredients for successful adhesive systems

Registration

<http://chemistry.org/shortcourses>

Contact

American Chemical Society Short Courses
phone: 800-227-5558 or +202-872-4508; email: shortcourses@acs.org

UPCOMING MEETINGS**Frontiers in Inorganic Polymers****16 -17 October 2003****Philadelphia Marriott Downtown, Philadelphia, Pennsylvania, USA**

Explore the frontiers of high performance materials with renowned authorities working at the forefront of this dynamic field.

Topics

- High-tech applications of inorganic polymers, including ceramics, ultra-strong fibers, electrical conductors, and photosensitive materials
- Demanding applications, such as those involving high temperatures, hostile environments, corrosion, or erosion
- Opportunities for polymer nanocomposites in automotive, barrier and aerospace applications, as well as the challenges for fabrication, processing and performance optimization of this new class of hybrids
- Sol-gel techniques for ceramics and hybrid organic-inorganic materials and their applications
- Polymeric precursor routes to ceramics, with special emphasis on the pyrolysis of organosilicon polymers to Si-based ceramic fibers, coatings, and composites
- Cutting-edge developments in high-performance materials
- The latest word on microlithographic applications

Registration

<http://chemistry.org/shortcourses>

Contact

American Chemical Society
phone: 800-227-5558 or +202-872-4600

Ferroelectricity Newsletter

including all back issues is available on Internet

<http://www.sp.nps.navy.mil/projects/ferro/ferro.html>

in Adobe Acrobat PDF file format

The PDF file format maintains the graphics and organization of the printed newsletter. Adobe Acrobat Reader is a helper application distributed free for Web browsers. Acrobat is available for Macintosh, Windows, DOS, SGI, and Sun SPARC operating systems.

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email: liebmann@redshift.com or rpanholzer@nps.navy.mil

mail: Hannah Liebmann

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Summer 2003

Ferroelectricity Newsletter

CALENDAR OF EVENTS

Aug 3-8 • 10th European Meeting on Ferroelectricity (EMF2003), Cambridge, UK (see *Ferroelectricity Newsletter*, Vol. 11, No. 1, p. 12)

Aug 17-22 • Polymer Chemistry: Principles and Practice, Blacksburg, Virginia, USA (see p.13)

Aug 24-29 • 9th International Conference on Ferroelectric Liquid Crystals (FLC2003), Dublin, Ireland (see *Ferroelectricity Newsletter*, Vol. 11, No. 1, p. 14)

Aug 31-
Sep 3 • Processing of Electroceramics, Bled, Slovenia (see p. 12)

Sep 15-18 • 4th (9th) International Seminar on Ferroelectrics Physics, Voronezh, Russia (see *Ferroelectricity Newsletter*, Vol. 11, No. 1, p. 15)

Sep 21-23 • 55 years of ferroelectrics, Leeds, England (see *Ferroelectricity Newsletter*, Vol. 11, No. 2, p. 9)

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Oct 1 • 8th Wide-Bandgap III Nitride Workshop, Richmond, Virginia, USA (see p. 13)

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Oc 16-17 • Frontiers in Inorganic Polymers, Philadelphia, Pennsylvania, USA (see p. 15)

Dec 7-12 • Polymer Chemistry: Principles and Practice, Blacksburg, Virginia, USA (see p.13)

Dec 14-17 • 4th Asian Meeting on Ferroelectrics 2003, Bangalore, India (see *Ferroelectricity Newsletter*, Vol. 10, No. 3, p. 22)
